PHAZR

July 6, 2016

VIA ELECTRONIC FILING

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, DC 20554

Re: Ex Parte – *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services* – GN Docket No. 14-177

Dear Ms. Dortch:

PHAZR believes power flux density (PFD) limits on satellite networks require strengthening in order to protect future 5G network operations.

PHAZR is a gigabit wireless solution provider. PHAZR is developing affordable and sustainable 5G Millimeter wave systems capable of providing 128X faster experience and 1,024X more capacity compared to 4G LTE.

When available in 2017, PHAZR's 5G millimeter wave system will be the industry's first integrated, high-power, commercial, 5G millimeter wave antennas array. At peak rates the system is expected to deliver 16 Gbps throughput per cell over a 200 MHz channel block, which will be an industry-first for these exclusively-licensed bands. Prototype equipment is expected to be available in 4Q 2016.

Attached please find an analysis of existing Satellite PFD standards in 47 CFR Section 25.208(q) and 25.208(r) protections for 39GHz licensees, as compared to much weaker terrestrial service protections defined in (i) ITU-R SF.1573 and (ii) 47 CFR Section 25.208(s) and 25.208(t). The strongest protections, 25.208(q) and 25.208(r), do not sufficiently protect 5G systems at larger angles of arrival, and thus require revision.

Because PHAZR is one of the first equipment developers scheduled to bring a 5G mobile and fixed prototype to the marketplace, it believes this information is extremely relevant to the FCC's deliberation process.

The FCC is strongly encouraged to enhance the existing fixed service protections in 47 CFR Sections 25.208(q) and 25.208(r) for 39GHz licensees, and to consider extending those protections to other wide-area licensed bands.

Thank you for your consideration.

Best regards,

Farooq Khan
CEO
PHAZR

Attachment

Max allowable PFD at the surface of the Earth

- The maximum allowable power flux-density (PFD) at the surface of the Earth from any one satellite should not exceed, in any 1 MHz band:

Angle of arrival, θ	Max allowable PFD [dB(W/m2)] in 1 MHz band			
	REC ITU-R SF.1573	**47 CFR 25.208(q)**	**47 CFR 25.208(r)**	**47 CFR 25.208(s/t)**
0° ≤ θ ≤ 5°	–127	–139	-132	-115
5° < θ ≤ 20°	–127 + (4/3)(θ – 5)	–139 + (4/3)(θ – 5)	–132 + (4/3)(θ – 5)	–115 + (1/2)(θ – 5)
20° < θ ≤ 25°	–107 + 0.4(θ – 20)	–119 + 0.4(θ – 20)		
25° < θ ≤ 90°	–105	–117	-117	-105

+12dB (rain fade)

RECOMMENDATION ITU-R SF.1573

- In the bands 37.5-40 GHz and 42-42.5 GHz, which are shared between GSO fixed-satellite systems and systems in the FS, Interference from GSO fixed-satellite systems far exceeds the Noise floor both at the 5G base station and the device
- Larger Angle of arrivals (degrees above the horizontal plane) would also create interference due to reflections from the earth surface and other objects on the ground

Angle of arrival, θ	Max allowable PFD [dBm/m2/MHz]	Noise Floor [dBm/MHz]	PFD above Noise Floor [dB]		
			Antenna aperture=1m^2	5G Base station	5G Device
5°	-97	-114	**17**	**7**	**-3**
15°	-83.7	-114	**30.3**	**20.3**	**10.3**
25°	-75	-114	**39**	**29**	**19**

5G Base station antenna aperture=0.1m^2, 5G device antenna aperture=0.01m^2

47 CFR 25.208(q)

- In the band 37.5-40.0 GHz, the power flux-density at the Earth's surface produced by emissions from a geostationary space station exceeds the Noise floor for very large Angle of arrivals only.
- Larger Angle of arrivals would also create interference due to reflections from the earth surface and other objects on the ground

Angle of arrival, θ	Max allowable PFD [dBm/m2/MHz]	Noise Floor [dBm/MHz]	PFD above Noise Floor [dB]		
			Antenna aperture=1m^2	5G Base station	5G Device
5°	-109	-114	**5**	**-5**	**-15**
15°	-95.7	-114	**18.3**	**8.3**	**-1.7**
25°	-87	-114	**27**	**17**	**7**

5G Base station antenna aperture=0.1m^2, 5G device antenna aperture=0.01m^2

47 CFR 25.208(r)

- In the band 37.5-40.0 GHz, the power flux-density at the Earth's surface produced by emissions from a non-geostationary space station exceeds the Noise floor for Larger Angle of arrivals.
- Larger Angle of arrivals would also create interference due to reflections from the earth's surface and other objects on the ground

Angle of arrival, θ	Max allowable PFD [dBm/m2/MHz]	Noise Floor [dBm/MHz]	PFD above Noise Floor [dB]		
			Antenna aperture=1m^2	5G Base station	5G Device
5°	-102	-114	12	2	-8
15°	-90	-114	24	14	4
25°	-87	-114	27	17	7

5G Base station antenna aperture=0.1m^2, 5G device antenna aperture=0.01m^2

47 CFR 25.208(s/t)

- In the band 40.5-42.0 GHz, the power flux density at the Earth's surface produced by emissions from a non-geostationary space station far exceeds the Noise floor for All Angle of arrivals (degrees above the horizontal plane).
- Larger Angle of arrivals would also create additional interference due to reflections from the earth's surface and other objects on the ground

Angle of arrival, θ	Max allowable PFD [dBm/m2/MHz]	Noise Floor [dBm/MHz]	PFD above Noise Floor [dB]		
			Antenna aperture=1m^2	5G Base station	5G Device
5°	-85	-114	29	19	9
15°	-90	-114	24	14	4
25°	-75	-114	39	29	19

5G Base station antenna aperture=0.1m^2, 5G device antenna aperture=0.01m^2